SEQUENCE LISTING

<110> SARCABAL, PATRICIA
      CROUX, CHRISTIAN
      SOUCAILLE, PHILIPPE

<120> METHOD FOR PREPARING 1,3-PROPANEDIOL BY A RECOMBINANT
      MICRO-ORGANISM IN THE ABSENCE OF COENZYME B12 OR ONE OF
      ITS PRECURSORS

<130> CHEP:004US

<140> 10/043,639
<141> 2002-01-09

<150> PCT/FR00/01981
<151> 2000-07-07

<150> FR 99/08939
<151> 1999-07-09

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<170> PatentIn Ver. 2.1

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Ser Gln Val Phe Pro Glu Phe Ser Asn Lys Trp Leu Gln Asp Glu Leu
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Asp Arg Leu Asn Lys Arg Thr Gly Asp Ala Phe Gln Ile Ser Glu Glu
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Ser Lys Glu Lys Leu Lys Asp Val Phe Glu Tyr Trp Asn Gly Lys Thr
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Thr Ser Glu Leu Ala Thr Ser Tyr Met Thr Glu Glu Thr Arg Glu Ala
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Val Asn Cys Glu Val Phe Thr Val Gly Asn Tyr Tyr Tyr Asn Gly Val
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Glu Ala Ala Ile Thr Tyr Val Asn Arg Tyr Ala Lys Lys Ala Lys Glu
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Ile Ala Lys Ile Cys Ser Lys Val Ser Gly Glu Gly Ala Lys Ser Phe
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Glu Ser Asn Gly His Ser Ile Ser Pro Ala Arg Phe Asp Gln Tyr Met
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Tyr Pro Tyr Tyr Glu Asn Asp Lys Asn Ile Thr Asp Lys Phe Ala Gln
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Glu Leu Ile Asp Cys Ile Trp Ile Lys Leu Asn Asp Ile Asn Lys Val
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Arg Asp Glu Ile Ser Thr Lys His Phe Gly Gly Tyr Pro Met Tyr Gln
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Lys Leu Ile Val Gly Gly Gln Asn Ser Glu Gly Lys Asp Ala Thr Asn
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Lys Val Ser Tyr Met Ala Leu Glu Ala Ala Val His Val Lys Leu Pro
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Gln Pro Ser Leu Ser Val Arg Ile Trp Asn Lys Thr Pro Asp Glu Phe
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Leu Leu Arg Ala Ala Glu Leu Thr Arg Glu Gly Leu Gly Leu Pro Ala
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Tyr Tyr Asn Asp Glu Val Ile Ile Pro Ala Leu Val Ser Arg Gly Leu
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Gln Lys Pro Gly Lys Thr Glu Gly Trp His Asp Ser Ala Phe Phe Asn
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Leu Ala Arg Ile Val Glu Leu Thr Ile Asn Ser Gly Phe Asp Lys Asn
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His Met Cys Cys Ala Asp Asn Cys Ile Asp Ile Ala His Ala Glu Arg
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Ala Pro Leu Pro Phe Leu Ser Ser Met Val Asp Asn Cys Ile Gly Lys
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Gly Lys Ser Leu Gln Asp Gly Gly Ala Glu Tyr Asn Phe Ser Gly Pro
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Gln Gly Val Gly Val Ala Asn Ile Gly Asp Ser Leu Val Ala Val Lys
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Lys Asn Ala Pro Lys Phe Gly Asn Asp Ile Asp Glu Val Asp Asn Leu
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Ala Arg Glu Gly Ala Leu Val Tyr Cys Arg Glu Val Asn Lys Tyr Thr
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Asn Pro Arg Gly Gly Asn Phe Gln Pro Gly Leu Tyr Pro Ser Ser Ile
625                 630                 635                 640

Asn Val Tyr Phe Gly Ser Leu Thr Gly Ala Thr Pro Asp Gly Arg Lys
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Ser Gly Gln Pro Leu Ala Asp Gly Val Ser Pro Ser Arg Gly Cys Asp
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Val Ser Gly Pro Thr Ala Ala Cys Asn Ser Val Ser Lys Leu Asp His
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Phe Ile Ala Ser Asn Gly Thr Leu Phe Asn Gln Lys Phe His Pro Ser
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Ala Leu Lys Gly Asp Asn Gly Leu Met Asn Leu Ser Ser Leu Ile Arg
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Ser Tyr Phe Asp Gln Lys Gly Phe His Val Gln Phe Asn Val Ile Asp
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Lys Lys Ile Leu Leu Ala Ala Gln Lys Asn Pro Glu Lys Tyr Gln Asp
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Ile Asp Lys Ser Lys Cys Thr Glu Cys Thr Lys Cys Val Asp Asn Cys
                85                  90                  95

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Val Ile Lys Glu Leu Lys Lys Asp Ser Val Gln Tyr Arg Arg Ser Asn
            115                 120                 125

Gly Gly Ile Thr Leu Ser Gly Gly Glu Val Leu Leu Gln Pro Asp Phe
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Pro Tyr Ile Asp Leu Ala Met Ile Asp Ile Lys Ser Met Asn Asp Glu
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Ile His Arg Lys Phe Thr Gly Val Ser Asn Glu Ile Ile Leu Gln Asn
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Ile Lys Leu Ser Asp Glu Leu Ala Lys Glu Ile Ile Ile Arg Ile Pro
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Val Ile Glu Gly Phe Asn Ala Asp Leu Gln Ser Ile Gly Ala Ile Ala
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Gln Phe Ser Lys Ser Leu Thr Asn Leu Lys Arg Ile Asp Leu Leu Pro
            245                 250                 255

Tyr His Asn Tyr Gly Glu Asn Lys Tyr Gln Ala Ile Gly Arg Glu Tyr
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               85                  90                  95

Val Gly Gly Gly Ser Ser His Asp Cys Gly Lys Gly Ile Gly Ile Ala
               100                 105                 110

Ala Thr His Glu Gly Asp Leu Tyr Asp Tyr Ala Gly Ile Glu Thr Leu
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Val Asn Pro Leu Pro Pro Ile Val Ala Val Asn Thr Thr Ala Gly Thr
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Ala Ser Glu Leu Thr Arg His Cys Val Leu Thr Asn Thr Lys Lys Lys

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          145                    150                    155                    160

Ile Lys Phe Val Ile Val Ser Trp Arg Asn Leu Pro Leu Val Ser Ile
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Asn Asp Pro Met Leu Met Val Lys Lys Pro Ala Gly Leu Thr Ala Ala
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Thr Gly Met Asp Ala Leu Thr His Ala Ile Glu Ala Tyr Val Ser Lys
              195                    200                    205

Asp Ala Asn Pro Val Thr Asp Ala Ser Ala Ile Gln Ala Ile Lys Leu
    210                    215                    220

Ile Ser Gln Asn Leu Arg Gln Ala Val Ala Leu Gly Glu Asn Leu Glu
225                    230                    235                    240

Ala Arg Glu Asn Met Ala Tyr Ala Ser Leu Leu Ala Gly Met Ala Phe
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Asn Asn Ala Asn Leu Gly Tyr Val His Ala Met Ala His Gln Leu Gly
              260                    265                    270

Gly Leu Tyr Asp Met Ala His Gly Val Ala Asn Ala Met Leu Leu Pro
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His Val Glu Arg Tyr Asn Met Leu Ser Asn Pro Lys Lys Phe Ala Asp
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Ile Ala Glu Phe Met Gly Glu Asn Ile Ser Gly Leu Ser Val Met Glu
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Ala Ala Glu Lys Ala Ile Asn Ala Met Phe Arg Leu Ser Glu Asp Val
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Gly Ile Pro Lys Ser Leu Lys Glu Met Gly Val Lys Gln Glu Asp Phe
          340                    345                    350

Glu His Met Ala Glu Leu Ala Leu Leu Asp Gly Asn Ala Phe Ser Asn
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Pro Arg Lys Gly Asn Ala Lys Asp Ile Ile Asn Ile Phe Lys Ala Ala
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Tyr
385
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<210> 10
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RAW SEQUENCE LISTING                    DATE: 04/24/2003
PATENT APPLICATION:  US/10/043,639A       TIME: 16:21:33

Input Set : D:\Chep004.app
Output Set: N:\CRF4\04242003\J043639A.raw

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  4         CROUX, CHRISTIAN
  5         SOUCAILLE, PHILIPPE
  7 <120> TITLE OF INVENTION: METHOD FOR PREPARING 1,3-PROPANEDIOL BY A RECOMBINANT
  8         MICRO-ORGANISM IN THE ABSENCE OF COENZYME B12 OR ONE OF
  9         ITS PRECURSORS
 11 <130> FILE REFERENCE: CHEP:004US
 12 <140> CURRENT APPLICATION NUMBER: 10/043,639A
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C--> **14 <141> CURRENT FILING DATE: 2003-04-12**
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 17 <151> PRIOR FILING DATE: 2000-07-07
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 20 <151> PRIOR FILING DATE: 1999-07-09
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 24 <170> SOFTWARE: PatentIn Ver. 2.1
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 33 ttaaatgcta aaccatgtgt tgaatcagaa agagcaatat taataacaga atcatttaaa  120
 34 caaacagaag gccagccagc aattttaaga agagcattgg cattgaaaca catacttgaa  180
 35 aatatcccta tatcaattag agatcaagaa cttatagtgg gaagtttaac taaagaacca  240
 36 agtcttcac aagtatttcc tgagttttct aataagtggt tacaagatga attggatata  300
 37 ttaaataaga gatctggaga tgccattccaa atttcagaag aaagtaaaga aaaattaaaa  360
 38 catgtctttg agtattggaa tggaaagaca acaagtgagt tagcaacttc atatatgaca  420
 39 taggaaacaa gagaggcagt aaattgtgaa gtatttactg taggaaacta ctattataat  480
 40 ggcgtaggac atctatctgt agattatgga aaagtattaa gggttggatt taatgggatt  540
 41 ataaatgaag ctaggaaca attagaaaaa aacaggagta tagatcctga ttttataaag  600
 42 aaagaaaaat tcctaaatag tgttattatc tcatgcgaag ctgcaataac atatgtaaat  660
 43 agatatgcta aaagcctaa agagattgca gataatacaa gtgatgcaaa aagaaaagt  720
 44 gaattaaatg aaatagcaaa aatttgttca aagtttcag gagagggagc taaatctttc  780
 45 tatgaagcat gtaaattatt ttggtttatt catgcaataa taaatataga atctaatgga  840
 46 catctattt ctccagctag attcatcaa tacatgtatc catattatga aaatgataaa  900
 47 aatataacag ataagtttgc tcaagaatta atagattgta tctggattaa attaaatgat  960
 48 attaataaag tagagatga gatttcaact aaacatttg gtggttaacc aatgtatcaa  1020
 49 aaattaattg ttggggtca aaattcagaa ggaaagatg caactaataa agtatcatat  1080
 50 atggcattag aagcagctgt ccatctaaag ttgcctcagc catctttgtc agtaagaata  1140
 51 tggaataaga ctccagatga attttgctt agagcagcag aattaactag agaagggtta  1200
 52 ggacttcctg cttattataa tgatgaagtt attattccac cattagttt tagaggtt  1260
 53 acattagaag atgcaagaga ctacggaata attggatgtg ttgaaccaca aaagccagga  1320
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PATENT APPLICATION:  **US/10/043,639A**

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57 catatgtgct gtgctgataa ttgcatagat attgcacatg cagaaagagc tccattacct 1560
58 ttcttgtcat caatggttga taattgtatc ggaaaaggaa agagccttca agatggtggt 1620
59 gcagaatata acttcagtgg accacaaggt gttggagtag ctaatattgg agattcatta 1680
60 gttgcagtta aaaaaattgt gtttgatgaa aataagatta ctccttcaga attaaagaaa 1740
61 acattaaata atgatttaa aaattcagaa gaaatacaag ccttactaaa aaatgctcct 1800
62 aagtttggaa atgatattga tgaagttgat aatttagcta gagagggtgc attagtatac 1860
63 tgtagagaag ttaataaata tacaaatcca aggggaggaa attttcaacc aggattatat 1920
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65 tccggacaac cattagctga tggggtttct ccatcaagag gctgtgatgt atctggacct 2040
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67 tttaatcaaa aattccatcc gtcagcatta aaaggtgata atggattaat gaatttatca 2160
68 tcattaataa caagttattt tgatcaaaag ggatttcatg ttcaatttaa tgtaatagat 2220
69 aaaaaatat tacttgcagc acaaaaaaat cctgaaaaat atcaagattt aattgttaga 2280
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77 <213> ORGANISM: Clostridium butyricum
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82 aatccagaat cctaagatat taaacctcaa gtaatgttta ataaaaattt atgtacaaaa 180
83 tgtggaagat gtaaatctca atgtaaaagt gcaggtattg atatgaattc agaatatagg 240
84 atagataaaa gcaaatgtac agagtgtaca aaatgtgttg ataattgctt aagcggggca 300
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87 caaccagatt ttgtagtgga gcttttaaaa gagtgtaaat catatggctg gcacactgcc 480
88 attgaaacag caatgtatgt taatagtgaa tctgtaaaaa aagtaattcc atatatagat 540
89 ctggctatga ttgatataaa aagtatgaat gatgaaatcc ataggaaatt tacaggagtg 600
90 agtaacgaaa taatattaca aaacattaaa ttaagtgatg aattagctaa agaaataata 660
91 atacaaattc ctgtaataga aggatttaat gcagatttac aaagtatagg agcaatagct 720
92 caattttcaa aatcattaac aaatcttaaa agaatagatc ttcttccata ccataattat 780
93 gtagaaaata agtatcaagc aattggaaga gagtattctt tgaaagaact aaaatcacct 840
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100 <212> TYPE: DNA
101 <213> ORGANISM: Clostridium butyricum
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116 ggattagatg ttgtatatta tgacggagtt gaaccaaatc caaaagatgt taatgttata 240
117 gaaggattaa aaatatttaa agaagaaaat tgtgacatga tagtaactgt aggtggagga 300
118 agttcgcatg attgcggtaa gggaatagga attgctgcaa cacatgaagg agatctttat 360
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122 cttatggtca aaaaactgc aggattaaca gcagctacag gaatggatgc tttaacacat 600
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140 <400> SEQUENCE: 5

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143 caattgtatt agtttttaact ttagataaaa caaacaaaaa tgttattatt agccaagaaa 180
144 atactgttac aaaagaaaag agaaaaacat agcaaaagag taccaatatt aagcaataaa 240
145 gtttgttaaa atattatcaa taaaatgata agattagata aaccaagtaa gaatgtgatt 300
146 gaaggagtaa aaatgataag taaaggattt agtaccaaa cagaaagaat aaatatttta 360
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211 ctataaatga tccaatttctt atggtcaaaa aactgcaatg attaacatca gttatatgaa 4260
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016  atgatatggc acatggtgtt gctaatgcaa tgctattacc acatgttgaa cgttataata 4560
017  tgctatcaaa tcctaagaag tttgcagata tagcagaatt tatgggagaa aatatatctg 4620
018  gactttctgt aatggaagca gcagagaaag ccataaatgc aatgttcagg ctttcagagg 4680
019  atgttggaat tcggaaaagt ctaaaggaga tgggagtgaa acaagaagat tttgagcata 4740
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021  aagatattat aaatattttt aaggctgctt attaattaat actatttaaa ggattcaaag 4860
022  taaaagataa aacatatata tattagattt aagatttat tataggctaa caacaaagaa 4920
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031 <400> SEQUENCE: 6

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039              35                  40                  45
041  Arg Ala Leu Ala Leu Lys His Ile Leu Glu Asn Ile Pro Ile Thr Ile
042          50                  55                  60
044  Arg Asp Gln Glu Leu Ile Val Gly Ser Leu Thr Lys Glu Pro Arg Ser
045      65                  70                  75                  80
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048              85                  90                  95
050  Asp Arg Leu Asn Lys Arg Thr Gly Asp Ala Phe Gln Ile Ser Glu Glu
051              100                 105                 110
053  Ser Lys Glu Lys Leu Lys Asp Val Phe Glu Tyr Trp Asn Gly Lys Thr
054              115                 120                 125
056  Thr Ser Glu Leu Ala Thr Ser Tyr Met Thr Glu Glu Thr Arg Glu Ala
057      130                 135                 140
059  Val Asn Cys Glu Val Phe Thr Val Gly Asn Tyr Tyr Tyr Asn Gly Val
060  145                 150                 155                 161
062  Gly His Val Ser Val Asp Tyr Lys Val Leu Arg Val Gly Phe Asn Gly
063              165                 170                 175
065  Ile Ile Asn Glu Ala Lys Glu Gln Leu Glu Lys Asn Arg Ser Asp Pro
066              180                 185                 190
068  Asp Phe Ile Lys Lys Glu Lys Phe Leu Asn Ser Val Ile Ile Ser Cys
069              195                 200                 205
071  Glu Ala Ala Ile Thr Tyr Val Asn Arg Tyr Ala Lys Lys Ala Lys Glu
072      210                 215                 220
074  Ile Ala Asp Asn Thr Ser Asp Ala Lys Arg Lys Ala Glu Leu Asn Glu
075  225                 230                 235                 240
077  Ile Ala Lys Ile Cys Ser Lys Val Ser Gly Glu Gly Ala Lys Ser Phe
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VERIFICATION SUMMARY          DATE: 04/24/2003
PATENT APPLICATION:  US/10/043,639A      TIME: 16:21:34

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